BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

Fig. 1 is a cut-away view of the anatomy of a patient with the inventive non-cannulated dilator inserted into the patient to the target area;

Fig. 2 is a perspective view of a series of sequentially enlarged diameter dilators that are inserted over the non-cannulated dilator in order to widen the cavity to insert the cannula;

Fig. 3 is an elevated view of the non-cannulated dilator showing the details of this invention;

Fig. 4 is an end view of the proximal end of this invention illustrating the ~~blunted tip~~ tool engaging portion; and

Fig. 5 is an end view of the ~~proximal~~ distal end of this invention illustrating the ~~tool engaging portion~~ blunted tip.

Detailed Description of the Invention

While this invention in its preferred embodiment discloses ovoid shaped dilators, it is to be understood as those skilled in this art will appreciate, any shaped dilators and cannulas can be utilized with this invention. However, the initial dilator is non-cannulated, i.e. it is a solid elongated cylindrical body with a judiciously shaped pointed tip at the distal

Fig. 1 is a cut-away view of the anatomy of a patient with the inventive non-cannulated dilator inserted into the patient to the target area;

Fig. 2 is a perspective view of a series of sequentially enlarged diameter dilators that are inserted over the non-cannulated dilator in order to widen the cavity to insert the cannula;

Fig. 3 is an elevated view of the non-cannulated dilator showing the details of this invention;

Fig. 4 is an end view of the proximal end of this invention illustrating the tool engaging portion; and

Fig. 5 is an end view of the a distal end of this invention illustrating the blunted tip.

Detailed Description of the Invention

While this invention in its preferred embodiment discloses ovoid shaped dilators, it is to be understood as those skilled in this art will appreciate, any shaped dilators and cannulas can be utilized with this invention. However, the initial dilator is non-cannulated, i.e. it is a solid elongated cylindrical body with a judiciously shaped pointed tip at the distal

end and a tool receiving tip at the proximal end. Obviously, it is not imperative that the non cannulated dilator be cylindrical or circular in cross section as ovoid or other cross sectional shapes can be substituted therefor without departing from the scope of this invention. The term "cavity" as used herein refers to the opening in the patient formed by the non cannulated dilator, dilators and dilator retractor and becomes a working channel when the non cannula dilator and dilators are removed from the dilator retractor for the surgeon to use to perform the minimal invasive surgery. the terms "cannula" and "dilator retractor" as used herein have the same meaning and are used interchangeably.

The invention can best be seen by referring to all the Figs where the inventive non-cannulated dilator is generally illustrated by reference numeral 10 consisting of a cylindrical solid elongated body 12, a tool receiving portion 14 at the proximal end, and the pointed ~~cutting~~ Parting tip portion 16 at the distal end. In accordance with this invention the diameter of the cylindrical solid elongated body 12 is greater than one and a half (1½) mm and preferably substantially equal to five (5) mm. The very end of the tip portion 16 is rounded and defines a blunt portion 20 as opposed to a needle type shape that

end and a tool receiving tip at the proximal end. Obviously, it is not imperative that the non cannulated dilator be cylindrical or circular in cross section as ovoid or other cross sectional shapes can be substituted therefor without departing from the scope of this invention. The term "cavity" as used herein refers to the opening in the patient formed by the non cannulated dilator, dilators and dilator retractor and becomes a working channel when the non cannula dilator and dilators are removed from the dilator retractor for the surgeon to use to perform the minimal invasive surgery. the terms "cannula" and "dilator retractor" as used herein have the same meaning and are used interchangeably.

The invention can best be seen by referring to all the Figs where the inventive non-cannulated dilator is generally illustrated by reference numeral 10 consisting of a cylindrical solid elongated body 12, a tool receiving portion 14 at the proximal end, and the pointed parting tip portion 16 at the distal end. In accordance with this invention the diameter of the cylindrical solid elongated body 12 is greater than one and a half (1½) mm and preferably substantially equal to five (5) mm. The very end of the tip portion 16 is rounded and defines a blunt portion 20 as opposed to a needle type shape that

would be found, for example, on the heretofore utilized guide wire. The preferred dimensions are shown in Figs. 3, 4 and 5. As follows:

A = 171.5 (millimeters) (6.750 inches)
θ = 16 degrees
B = 5.28 mm (0.208") diameter
C = 1.0 mm (0.039") diameter
D = Hex shape and extends 1.27 mm (.50") axially

While these dimensions are disclosed in the preferred embodiment as being preferred, as one skilled in this art will recognize that these dimensions can be slightly modified without departing from the scope of this invention. However, it is abundantly important that the very tip ~~20~~ 16 of the ~~tip~~ blunt portion ~~16~~ 20 be blunted and the diameter of the cylindrical body 12 be sufficiently large so that the tissue and muscle of the area being penetrated affords a resistance whereby the surgeon will have a feel as the instrument penetrates different portion of the anatomy. In comparison with a guide wire as used heretofore, the non-cannulated dilator 10 of this invention is relatively rigid and will not bend or flex when attempted to be bent under the normal force of the human hands as opposed to the guide wire that will bend and flex under the same force conditions.

After a small stab wound is made at the entry point, as shown in Fig.

would be found, for example, on the heretofore utilized guide wire. The preferred dimensions are shown in Figs. 3, 4 and 5. As follows:

A = 171.5 (millimeters) (6.750 inches)
θ = 16 degrees
B = 5.28 mm (0.208") diameter
C = 1.0 mm (0.039") diameter
D = Hex shape and extends 1.27 mm (.50") axially

While these dimensions are disclosed in the preferred embodiment as being preferred, as one skilled in this art will recognize that these dimensions can be slightly modified without departing from the scope of this invention. However, it is abundantly important that the very tip 16 of the blunt portion 20 be blunted and the diameter of the cylindrical body 12 be sufficiently large so that the tissue and muscle of the area being penetrated affords a resistance whereby the surgeon will have a feel as the instrument penetrates different portion of the anatomy. In comparison with a guide wire as used heretofore, the non-cannulated dilator 10 of this invention is relatively rigid and will not bend or flex when attempted to be bent under the normal force of the human hands as opposed to the guide wire that will bend and flex under the same force conditions.

After a small stab wound is made at the entry point, as shown in Fig.

1, the non cannulated dilator 10 is "worked" by forcing and partially rotating the dilator with the use of a tool (not shown) attached to the tool engaging end 14 until it reaches its target, and in this instance, until it reaches the inferior edge of the superior lamina. Obviously, under circumstances where the tissue and muscle do not pose a restrictive force that is sufficient to justify the use of a tool when being inserted, the non cannulated dilator may be inserted without the use of a tool. As is apparent from Fig. 1, the tip portion 16 is designed to pass through the muscle fibers and allows the surgeon to maintain a course directed toward the intended anatomical target.

Once the target has been reached, each of the dilators 18 are sequentially inserted over the non cannulated dilator in the order of the smallest to the largest diameter dilator and likewise are worked with the use of a tool until the target is reached. The non cannulated dilator 10 can be marked with a graduated scale that the surgeon can use to select the proper sized dilator retractor or cannular ~~20~~ 21. The cannula or dilator retractor ~~20~~ 21 is inserted over the last of the dilators 18 whereby the surgeon then has access to the target in order to proceed with the surgery or stated another way the dilator retractor ~~20~~ 21 defines a working channel to accommodate all of the

1, the non cannulated dilator 10 is "worked" by forcing and partially rotating the dilator with the use of a tool (not shown) attached to the tool engaging end 14 until it reaches its target, and in this instance, until it reaches the inferior edge of the superior lamina. Obviously, under circumstances where the tissue and muscle do not pose a restrictive force that is sufficient to justify the use of a tool when being inserted, the non cannulated dilator may be inserted without the use of a tool. As is apparent from Fig. 1, the tip portion 16 is designed to pass through the muscle fibers and allows the surgeon to maintain a course directed toward the intended anatomical target.

Once the target has been reached, each of the dilators 18 are sequentially inserted over the non cannulated dilator in the order of the smallest to the largest diameter dilator and likewise are worked with the use of a tool until the target is reached. The non cannulated dilator 10 can be marked with a graduated scale that the surgeon can use to select the proper sized dilator retractor or cannular 21. The cannula or dilator retractor 21 is inserted over the last of the dilators 18 whereby the surgeon then has access to the target in order to proceed with the surgery or stated another way the dilator retractor 21 defines a working channel to accommodate all of the